

REMARKS

In the present Amendment, the specification has been amended to correct typographical errors. No new matter has been added, and entry of the Amendment is respectfully requested.

Claims 1-8 and 13-18 are pending.

At page 2 of the Action, the disclosure is objected to because of the following informalities: (I) in paragraph [0064], "bispentamethylene" should read --bispentamethyl-- (page 21, lines 4 and 6); and (II) in paragraph [0065], "...borasne" is misspelled (see page 21, penultimate line).

As noted, the specification has been amended to correct the typographical errors. Withdrawal of the objection to the specification is respectfully requested.

At page 3 of the Action, claims 8 and 17 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Pedretti et al (U.S. 4,429,089, "Pedretti").

Applicants submit that this rejection should be withdrawn because Pedretti does not disclose or render obvious the present invention.

The Examiner contends that Pedretti discloses polymerization of 1,3-butadiene at a temperature lower than 25°C (viz., 20°C), in the presence of a catalyst system prepared by disclosed procedure A (see Examples 18, 19, and 23). Per procedure A, the Examiner states, the catalyst system was prepared by adding a solvent, a component (A) (organic metallic compound of aluminum), diolefine, lanthanide complex (C) and Lewis acid (B) to a bottle, which was then placed to carry out polymerization in a rotary bath (col. 5, line 65 to col. 6, line 5).

The Examiner takes the position that as butadiene polymerization was conducted subsequent to the preparation procedure, the catalyst system used in Examples 18, 19, and 23 is considered to meet the "previously prepared" limitation of claim 8.

Applicants respectfully disagree.

Pedretti does not teach, in the examples at low polymerization temperature such as 20°C (ex. 18, 19, and 23), that the catalyst system is previously prepared in the presence of neodymium compound, aluminiumalkyl compound, source of halogen, and small portion of conjugated diene monomer, as required by the present claims. Further, Pedretti does not teach that it is especially advantageous to "pre-form" the polymerization catalyst prior to contacting the catalyst with major portion of the conjugated diene monomer.

In the present invention, such "catalyst pre-formation" is critical to achieve highly pure microstructure of the resulting polymer, narrow Mw/Mn of the resulting polymer, and sufficiently fast conversion of monomer to polymer. If "catalyst in-situ formation" is used, such as the cases in Pedretti's experiments, converting catalyst precursor compounds into active catalyst ingredients takes much longer time at lower temperature (<25°C) than normal high temperature conditions (i.e., at 50°C and more), which may result in incomplete generation of desired active catalytic ingredients in practical polymerization time. This means that neodymium compounds in such system may have much more broader types of states than the case with catalyst pre-formation. The negative effect of such "in-situ" catalyst formation at low temperature polymerization result in undesired outcomes such as (1) slower conversion of monomer to polymer, (2) broader molecular weight distribution, (3) reduced reproducibility in microstructure of polymer.

Innovative thinking of the present invention resulted in the claimed advantageous process to produce ultra-high cis polyconjugated diene at reduced polymerization temperature together with pre-formed neodymium-based catalyst.

In view of the above, reconsideration and withdrawal of the §102(b) rejection of claims 8 and 17 based on Pedretti are respectfully requested.

At page 4 of the Action, claims 1-7 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly being obvious over Pedretti.

At page 5 of the Action, claims 13-16 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Pedretti, in view of Sandstrom et al (U.S. 6,046,266, "Sandstrom").

Applicants submit that the above two rejections should be withdrawn because Pedretti and Sandstrom do not disclose or render obvious the present invention, either alone or in combination.

In the Amendment filed September 24, 2008, Applicants explained (I) that the calculation method used by Pedretti is entirely different from that of the present invention and (II) that in the synthesis conditions of Pedretti, the cis content is less than 98% as calculated by the equation (IV) according to the present invention.

In response, the Examiner states that Applicants offer no objective evidence in support of the assertion nor specifically identify any evidence already of record establishing such to be the case. Therefore, the Examiner deemed the argument insufficient to rebut the prima facie case of unpatentability based on the correspondence in polymerization conditions between Pedretti and Applicants' synthesis method.

To address the Examiner's concern and to demonstrate that the present claims are patentable over Pedretti, Applicants submit herewith a Declaration under 37 C.F.R. § 1.132 executed by Mr. Eiju Suzuki, one of the co-inventors of the present application.

In the Declaration, Pedretti's Examples 26, 36, 29 and 40 were reproduced and measured. The results are shown in the Table at page 5 of the Declaration.

As seen from the Table, the polymers described in the Examples 36, 29 and 40 of Pedretti have a cis-1,4 bond content as measured by a Fourier transform infrared spectroscopy (FT-IR) of less than 98.0%, a vinyl bond content of more than 0.3% and a ratio (Mw/Mn) of weight average molecular weight (Mw) to number average molecular weight (Mn) of more than 3.5. And no polymer can be obtained by the procedure described in the Example 26 of Pedretti.

As shown by these results, it is confirmed that Pedretti does not disclose or suggest the claimed butadiene-based polymer having a 1,3-butadiene monomer unit, characterized in that the cis-1,4 bond content and the vinyl bond content in the 1,3-butadiene monomer unit as measured by the Fourier transform infrared spectroscopy (FT-IR) are not less than 98.0% and not more than 0.3%, respectively, and the ratio (Mw/Mn) of the weight average molecular weight (Mw) to the number average molecular weight (Mn) is 1.6-3.5.

As to Pedretti's Examples 18, 19, 21, 23-25, 30-32 and 34, the preparation method or distributor of $\text{Nd}(\text{O-nC}_{10}\text{H}_{21})_3$, required for the Examples 18, 19, 21, 23-25, 30-32 and 34, is not disclosed in Pedretti. Also no search information about $\text{Nd}(\text{O-nC}_{10}\text{H}_{21})_3$ is found at CAPlus with the following search queries: "s neodymium()decaoxide", "s neodymium()decanolate" and "e c30h63Ndo3 /mf".

Thus, the same procedure for $\text{Nd}(\text{OnBu})_3$ catalyst is applied by using 1-decanol (Aldrich cat# 239763) instead of 1-butanol. However, the attempt was not successful.

As seen from the result, the disclosed information in Pedretti is insufficient to reproduce Pedretti's Examples 18, 19, 21, 23-25, 30-32 and 34 which require $\text{Nd}(\text{O}-\text{nC}_{10}\text{H}_{21})_3$ catalyst.

Sandstrom is relied upon as teaching the benefits of including cis-1,4-polybutadiene rubber in tire tread and sidewall. Sandstrom does not make up for the deficiencies of Pedretti.

In view of the above, reconsideration and withdrawal of the rejections based on Pedretti and Sandstrom are respectfully requested.

At page 6 of the Action, claim 18 is objected to as being dependent upon a rejected base claim, but is indicated to be allowable if rewritten in independent form.

Claim 18 is patentable in its present form because claims 8 and 17 are patentable over Pedretti, as discussed above.

Allowance is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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